

# CHRONIC EXPOSURE TO ARSENIC VIA DRINKING WATER AND EVALUATION OF HEALTH EFFECTS IN 91 MUNICIPALITIES OF THE LAZIO REGION, ITALY

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**Background and aims:** Chronic exposure to arsenic (As) via drinking water is associated to several health problems, i.e. cancers, diabetes, respiratory and cardiovascular diseases. In response, the EC Directive set a limit of  $As \leq 10 \mu\text{g/L}$  in drinking water. In Italy several areas exceed this limit, including 91 municipalities in the Lazio Region.

This study investigates the association between As exposure via drinking water and health effects (mortality, disease incidence) in the 91 municipalities during 1990-2009.

**Methods:** The 91 municipalities are located in three provinces: Viterbo (60), Rome (22), Latina (9). Mortality and disease incidence for internal malignancies (lung, bladder, kidney, liver, prostate), diabetes, cardiovascular and respiratory disease were investigated. Relative Risks (RR) were calculated for each municipality using cause mortality/incidence rate compared to the rate in the region.

Chronic As exposure was estimated using As level in drinking water from measurements campaigns and developing an indicator based on the subject's residence. Geographical analysis using GIS techniques was performed to identify disease incidence and mortality clusters. To validate the exposure indicator a bio-monitoring study will be conducted in a sub-sample of the population (500 subjects), using urine, blood and hair samples.

**Results:** Retrospective mortality analysis for the selected causes showed some clusters in exposed municipalities, most evident in Viterbo and Latina provinces. In Rome province, clusters were found only for lung and bladder cancer. The estimated mortality excess for bladder by province varied from +20% in Rome to +39% in Latina. These preliminary results will be better investigated taking into account population levels of exposure and duration.

**Conclusions:** Chronic exposure to As in drinking water is a major public health concern. Considering the significant impact of high As concentrations on health reported in the literature, future research should focus on the long-term effects of exposure to low-medium concentrations, as in Italy.